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A THREE STAGED INTERDISCIPLINARY APPROACH IN MANAGEMENT OF A PERFORATED TOOTH WITH COMBINED INTERNAL AND EXTERNAL RESORPTION

Dr. Sruthy Prathap [1] | Dr. Prathap M. S [2]

[1] Associate Professor, Dept of Periodontology, Yenepoya Dental College, Deralakatte, Mangalore, India.

[2] Professor, Dept of Conservative Dentistry And Endo Dontics, Yenepoya Dental College, Deralakatte, Mangalore, India.

ABSTRACT

Root resorption is of major concern to endodontists. It is one of the common causes for root perforation which complicates endodontic treatment and often results in periodontal destruction. Proper diagnosis and an understanding of the aetiology and dynamics of the processes involved in tooth resorption is critical for effective management. Tooth resorption can have a multifactorial etiology. Traumatic injury, orthodontic treatment, bacteria, bacterial products and tissue destruction products within the root canal, periodontal treatment, local pressure and inflammation are some of the common causes for tooth resorption. Multinucleated clastic cells are responsible for destruction of bone, dentin and cementum. Usually a multidisciplinary approach is required in managing such cases. The following case report represents a surgical management of a tooth with combined internal and external resorption. The initiation and progression of the resorptive lesion has occurred due to iatrogenic errors from the previous endodontic treatment that resulted in a large perforation defect on the facial aspect of the upper left canine tooth associated with severe pain and periodontal involvement.

Management of the teeth was done in three stages. The use mineral trioxide aggregate (MTA) has resulted in the repair of the resorptive defect. Periodontal surgery with regenerative procedures were carried out in the later stage. At two year followup, the tooth showed signs of healing and arrest of root resorption along with considerable bone fill. Treatment of the mutilated teeth in three stages and involvement of an interdisplinary approach have resulted in good esthetic and functional outcome.

KEYWORDS: Perforation, Internal Resorption, External Resorption, MTA.

INTRODUCTION:

Procedural accidents present a source of frustration to dental clinicians. One such accident is the perforation of the tooth during endodontic treatment. However, contrary to the belief that once a tooth has been perforated, its prognosis becomes poor to hopeless, perforation repair can be a very successful and predictable procedure, a procedure that is routinely performed in our clinic. Presence of root resorption is one of the common causes for perforation. It also complicates the management of perforated teeth. Root resorption might be classified by its location in relation to the root surface, as external or internal resorption.[1] Inflammatory resorption occurs when the predentin or precementum becomes mineralized, mechanically damaged or scraped off.

Resorption extending from the external surface of the root is called external resorption. External root resorption can be further classified into surface resorption, external inflammatory resorption, external replacement resorption, external cervical resorption(ECR), and transient apical breakdown. Currently, the etiology of external cervical resorption is poorly understood and this may explain some of the diversity in terminology as clinicians have applied varying interpretations of the underlying pathogenesis. Other terms used to describe ECR include odontoclastoma, peripheral cervical resorption , extracanal invasive resorption, supraosseous extracanal invasive resorption, peripheral inflammatory root resorption, and subepithelial external root resorption .[2] Several etiologic factors have been suggested that might damage the cervical region of the root surface and therefore initiate ECR. These include dental trauma, orthodontic treatment, intracoronal bleaching, periodontal therapy, and idiopathic etiology.[3]

Internal root resorption originates from the walls of the root canal and in permanent teeth it is a complex interaction of inflammatory and resorbing cells, resulting in the formation of multinucleated giant cells and resorption of dental hard tissues. Traumatic injury, infection and orthodontic treatment have been suggested as etiological factors for internal resorption. Clinically IR has usually no symptoms and is diagnosed during routine radiographic examination.[4]

Radio graphically, it illustrates a uniform radiolucent lesion inside the root canal space that disturbs root canal natural outline and its relation with the root canal space would not displace following obtaining radiographic images with different angulations. Invasive cervical resorption is a form of internal resorption which describes its invasive and aggressive nature.[4]

Different materials available for management of tooth resorptions are, a) mineral trioxide aggregate (MTA), b) Glass ionomer cement, c) Super EBA (a reinforced zinc oxide cement; its liquid contains 32% eugenol and 68% ethoxy benzoic acid), d) Hydrophilic plastic polymer (2-hydroxyethyl methacrylate with barium salts), e) Zinc oxide eugenol and zinc acetate cement, f) Amalgam alloy and g) Thermo plasticized gutta-percha administered either by injection or condensation techniques.[5]

Types of perforations:

Supracrestal perforations: Perforations coronal to the crestal bone.

Apical third perforations:

Perforations in the apical third of the root, which can be considered as simply extra exit from the canal system.

Critical crestal zone perforations:

Perforations in the 'critical crestal zone' are invariably associated with a less favorable outcome and are frequently more difficult to manage. These perforations are most susceptible to epithelial migration and rapid periodontal pocket formation[6].

The factors that determine the success of teeth that have had a perforation include: location (sub-ossous, coronal, furcal, mid-root, or apical); size (small, medium, or large); length of time since the perforation (recent, or long standing); repair material (MTA, amalgam, Dycal, composite, or IRM); use of magnification (none, loupes, endoscope, or microscope); and the experience of the operator.

This case report presents surgical management of invasive cervical internal resorption combined with external resorption in relation to maxillary; left canine which resulted in crestal zone perforation with considerable loss of tooth structure near the cervical portion of the tooth and loss of interdental bone between the canine and first premolar.

CASE REPORT:

A 35 year old male patient was referred to the Department of conservative dentistry and endododontics, Yenepoya Dental College, Mangalore with a chief complaint of severe pain in relation to upper left canine. Patient gave a history of endodontic treatment 5 years ago. On clinical examination, the tooth was found to be tender on percussion and had a mobility of grade I. Vitality test was negative. A large perforation defect could be detected in the cervical region of the tooth on the facial surface.

Radiographic examination revealed an extensive radiolucent area involving the middle and cervical third of the root extending from the pulpal wall to the external root surface. A faulty endodontic restoration with inadequate cleaning and shaping was also observed.

Fig 1: Perforation on the labial aspect of the teeth. Radiograph shows internal and external root resorption.

On the first day of visit, the root canal filling material and the GP cone was removed. While retrieving the GP cones a small piece of cotton was found in the canal which struck to the instrument and was removed completely. The canal was then irrigated using 2.5% sodium hypochlorite solution followed by final irrigation using saline and the canal was dried using absorbent paper points. Calcium hydroxide was placed following which zinc oxide eugenol dressing was given. The patient was placed under antibiotics for five days. On the second visit the dressing was removed. Biomechanical preparation was done. The canal was thoroughly irrigated with 2% Chlorhexidene followed by saline. A master cone was placed after which the flap was elevated and the perforation defect exposed surgically.

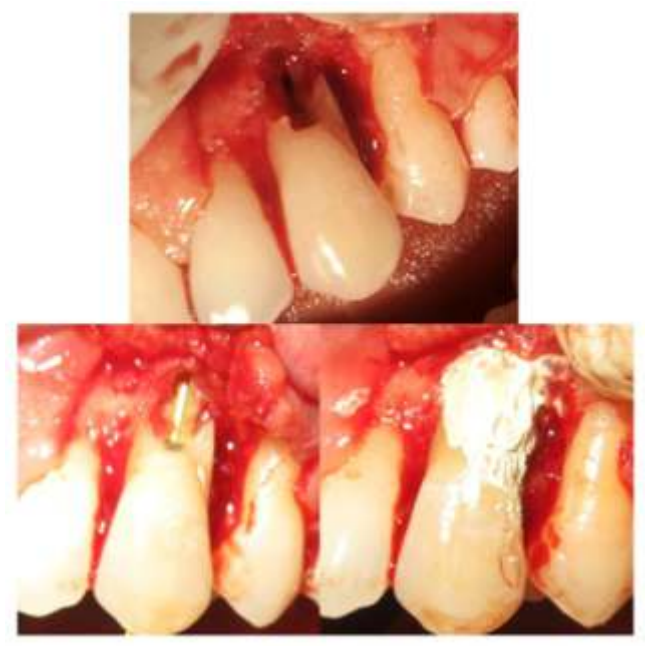

Fig 2: Surgical procedure: Resorption defect after surgically reflecting the flap. Master cone and MTA placement.

Root planing and degranulation was done in relation to the defect following which defect was sealed with Mineral Trioxide Aggregate (MTA). A cotton soaked in saline was applied over the MTA to facilitate faster setting. The flap was then sutured using nonresorbable black silk sutures. The tooth orifice was then restored with Cavit temp cement. Patient was recalled after 48hrs for obturation by lateral condensation technique.

During the 6 months follow up, the tooth was found to be asympotomatic. Radiographically the tooth appeared healthy but revealed some area of radiolucency around the margins of the restoration which may be attributed to the shrinkage of MTA. Clinically the margins of the restoration in the cervical region appeared dark. Hence a mucopertiosteal flap was raised and margins were then restored with glass ionomer cement.

Fig 3: 6 months postoperative photograph which shows black discolouration in the cervical region. Radiolucency along the margins of the restoration due to shrinkage. Rough margins of the restoration is restored using GIC .

After 6 months the patient was recalled. Although the tooth appeared healthy and patient was asymptomatic, Millers class III recession was observed and an angular defect was found in the interdental region between 23 and 24.

Fig 4: Millers class III recession and deep angular defect on the distal aspect at one year follow up from baseline. Treated by placing bonegraft in the defect and coronal advancement of flap.

After anesthetizing the area, a flap was raised , the defect was degranulated and synthetic hydroxyapatite bone graft was placed in the defect , the flap was then advanced coronally and sutured.

Six months post surgically the patient was recalled. The tooth showed root coverage and reduction in the probing pocket depth. Some amount of bonefill was also observed radiographically between 23 and 24 interdentally.

Fig 5: Root coverage and healthy gingiva observed at 2 year follow up and IOPA shows bone fill.

DISCUSSION:

Extensive internal resorption may complicate the prognosis of endodontic treatment due to weakening of the remaining dental structure and possible periodontal involvement[7] whereas external tooth resorption has been described as an "aseptic resorptive process, which may on occasions be secondarily invaded with microorganisms". Some have suggested that microorganisms from either the gingival sulcus 8 or the pulp space and dentinal tubules in teeth with necrotic pulps provide the necessary stimulus to sustain ECR lesions. However, maintenance of the tooth, especially in the anterior region, is of utmost importance for the patient from socioeconomic and especially psychological standpoints.

This case report describes the management of a teeth with combined internal and external resorption. Bacteria, bacterial products, and tissue breakdown products from with in the root canal system stimulate inflammation in the adjacent periodontal tissues leading to aggressive and progressive inflammatory resorption of the root10. Retention of cotton fibres in the pulp canal from the previous endodontic treatment has been the cause for internal cemental resorption which has progressed from the pulpal walls. The resultant alveolar bone loss and periodontal pocket have acted as a stimulus for the initiation and progression of external root resorption. The resorption cavity is often filled with a mass of fibrovascular tissue with active mononucleated and multi-nucleated clastic cells lining resportion lacunae[1].

Clastic cells are motile, multinucleated giant cells that are responsible for bone, dentin, and cementum resorption. They are formed by the fusion of mononuclear precursor cells of the monocyte-macrophage lineage derived from the spleen or bone marrow, as opposed to osteoblasts and osteocytes that are derived from skeletal precursor cells[2].

Factors, such as location of the perforation ,time elapsed since the perforation and size of the perforation[8], as well as the repair material used are important for a better prognosis following perforation. The periodontal prognosis of the teeth mainly depends on the location of the perforation. This is due to the fact that perforation of the crown or root causes an inflammatory process which causes break down of the periodontium which may extend to the gingival sulcus, producing a deep and un-manageable periodontal defect, the chances of which is higher when the perforation is coronal as compared to one that is apical.[1]

MTA is a fine powder primarily composed of tricalcium silicate, tricalcium aluminate, tricalcium oxide, and silicon oxide that, upon hydration forms a colloidal gel that solidifies in approximately 3 hours. Therefore, when used as a root repair material, moisture must be provided from the internal aspect of the root. MTA was used because of its reported ability to provide a biocompatible surface for the possible adhesion or attachment of bone and cementum. In addition, MTA inhibits the activity of bacteria, is not affected in the presence of moisture and blood, and also is able to harden and form a barrier because of its hydrophilic characteristic. Moisture in the surrounding tissue acts as an activator of a chemical reaction in this material.[9] MTA has been extensively used in dentistry for management of perforations originating from both external and internal tooth resorption.

In this case, the treatment was done in three stages. The first and second stage, involves endodontic treatment and restoration of the teeth after surgically exposing the root. After biomechanical preparation and placement of the master cone, resorption lacuna was exposed surgically followed by degranulation and irrigation. Later the resorption lacunae was sealed with mineral trioxide aggregate and endodontic treatment was completed within 48 hours. Six months postoperatively, shrinkage of the material resulted in rough restorative margins which acted as a nidus for more accumulation of microbial plaque and periodontal disease progression. Hence although the tooth was asymptomatic a second surgery was planned and the margins were restored with Glass ionomer cement. During 12 months follow up, a 5mm deep pocket and an angular defect still persisted distal to the tooth. Placement of synthetic bonegraft in the defect and coronal advancement of flap resulted in a good bonefill and root coverage respectively at 2 year followup.

CONCLUSION:

Presence of internal and external resorption complicates the endodontic as well as the periodontal prognosis of the teeth. This case report presents a favourable clinical outcome when MTA was used for treating combined external and internal tooth resorption . After completelely treating the teeth endodontically, periodontal regenerative procedures were carried out using synthetic bone graft along with coronal advancement of flap . This has resulted in adequate bonefill in the surgical site and root coverage. An interdisciplinary approach has improved the treatment outcome both esthetically and functionally.

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